Curriculum Vitae (CV)

Name: Jianmin Tao

Current Position: Postdoc Research Associate
Immigration Status: U.S. Permanent Residency

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Objective:
Faculty or research position at research universities or institutions.

Research Interests:
1) Time-dependent density functional theory (TDDFT):
   (i) Construction of dynamical exchange-correlation potentials;
   (ii) Continuum mechanics for nanoscale systems.
2) Theory of ultrafast optical phenomena for strongly correlated electronic materials.
3) Density functional theory (DFT):
   (i) Development of self-interaction corrected functionals;
   (ii) Long-range van der Waals interaction for molecules and solids;
   (iii) Meta-generalized gradient approximations;
   (iv) Construction of the exchange-correlation hole.
4) Current-density functional theory:
   Construction of current-density functionals for systems in a magnetic field.
5) Application of TDDFT/DFT to molecular materials and strongly-correlated systems.

Educational Background:
1/1998–5/2002 Ph.D degree in Physics with GPA = 3.9/4, Tulane University, New Orleans, Lousiana
Dissertation Title: "Density Functional Theory of Atoms, Molecules and Solids: Construction of Accurate Meta-Generalized Gradient Approximations for Exchange and Correlation"
Dissertation Advisor: Professor John P. Perdew

7/1985–1/1988 M.Sc. degree in Chemical Physics, University of Science and Technology of China, Heife, Anhui, China
Thesis: "Bounds and their applications to atoms and molecules"
Thesis Advisor: Professor Jianmin Li

9/1978–7/1982 B.Sc. in Chemistry, Yunnan Normal University, Kunming, Yunnan, China

Professional Experience

8/2009–Present Postdoc Research Associate under the supervision of Dr. Jian-Xin Zhu and Dr. Rich Martin, working on the application of DFT to strongly-correlated systems and photo-induced quasiparticle relaxation of superconductors.

8/2007–7/2009 Director's Postdoctoral Fellow with Dr. Jian-Xin Zhu and Dr. Sergei Tretiak, Los Alamos National Laboratory, Los Alamos, New Mexico 87545. Working on ultrafast optical phenomena in strongly correlated electron materials and application of DFT/TDDFT to the electronic properties of nanoscale systems.

7/2005–7/2007 Postdoctoral Fellow with Professor Giovanni Vignale, Department of Physics, University of Missouri, Columbia, Missouri 65211. Working on time-dependent density functional theory.

6/2002–6/2005 Postdoctoral Fellow with Professor John P. Perdew. Working on the development of density functional theory.

6/2004-12/2004 Adjunct Professor of Physics, Department of Physics, Tualne University. Teaching the calculus-based physics for engineering and science students.

1997–1998 Associate Professor of Chemistry, Yunnan Normal University, Kunming, Yunnan, China. Teaching physical chemistry.

1988–1997 Assitant Professor of Chemistry, Yunnan Normal University, Kunming, Yunnan, China. Teaching physical chemistry.

1982–1985 Teaching Assistant of Chemistry, Yunnan Normal University, Kunming, Yunnan, China. Teaching inorganic chemistry lab.

Competitive Honors/Awards:

2002 Award of the Natural Sciences of Yunnan Province, Yunnan, China
1999 Award for the excellent academic work and research achievement awarded by the educational committee of Yunnan Province, China
1999 Award for excellent papers awarded by Yunnan Normal University, China
Who's Who in the World (16th edition, 1999)
Who's Who in America (2009)

Relevant Extracurricular Activities:

Referee papers for:
Physical Review Letters
Physical Review A
Physical Review B
Journal of Chemical Physics
Journal of Physical Chemistry
Journal of Chemical Theory and Computation
International Journal of Quantum Chemistry
Langmuir
Proceedings of the Royal Society A

Physics Letters A
Physica E

Invited Presentations

1. **J. Tao**, Ultrafast Optical Conductivity in Strongly-Correlated Electronic Materials, Second International Symposium and Wowkshop on Correlated Electrons in Matter, April 2–8, 2009, Gatlinburg, Tennessee.
2. **J. Tao**, Density Functionals That Work and Time-Dependent Extension, January 29, 2009, Wake Forest University, Winston-Salem, North Carolina.
3. **J. Tao**, van der Waals-Corrected Density Functional Theory, Workshop on Mathematical and Algorithmic Challenges in Electronic Structure Theory, Minneapolis campus of the University of Minnesota, September 29-October 3, 2008.
4. **J. Tao**, Density Functional Theory and Its Time-Dependent Extension, College of Chemistry and Chemical Engineering, Yunnan University, Kunming, P.R. China, June 13, 2008.
5. **J. Tao**, Density Functional Theory and Its Time-Dependent Extension, College of Chemistry and Chemical Engineering, Yunnan Normal University, Kunming, P.R. China, June 12, 2008.
6. **J. Tao**, Density Functional Theory and Its Time-Dependent Extension, Strongly Correlated Electron Physics/T-11, Los Alamos National Laboratory, Los Alamos, New Mexico, October 15, 2007.
7. **J. Tao**, Density Functional Theory and Its Time-Dependent Extension, Department of Physics and Astronomy, University of Louisville, Louisville, Kentucky, January 25, 2007.
8. **J. Tao**, Time-Dependent Density Functional Theory beyond the Local Density Approximation, First LLNL International Symposium and Wowkshop on Correlated Electrons in Matter, December 8–11, 2006, Half Moon Bay, California.
9. J.P. Perdew, V.N. Staroverov, G.E. Scuseria, and J. Tao, Exact Exchange as a Component of Density Functional Approximations, 231th ACS National Meeting, March 26–30, 2006, Atlanta.
10. **J. Tao**, Density Functionals That Work, Department of Physics and Astronomy, University of Missouri-Columbia, Columbia, Missouri, September 21, 2005.
11. **J. Tao**, Non-empirical Construction of a Meta-GGA Density Functional and Useful Extensions, the INT DFT workshop on "Towards a Universal Density Functional for the Nucleus" organized at the Institute for Nuclear Theory in Seattle, September 26-30, 2005.
12. **J. Tao**, Construction and Performance of a Non-empirical Density Functional, Department of Physics and Astronomy, Rutgers The State University of New Jersey, Piscataway, New Jersey, April 14, 2005.

13. **J. Tao**, Meta-Generalized Gradient Approximation: Construction and Performance of a Non-empirical Density Functional, The Third International Workshop on *Electron Correlation and Materials Properties*, Kos, Greece, July 5–9, 2004.

Grants

2002–2004	Basic And Applied Science Foundation Of Yunnan Province, 35,000 RMB (1 USD $\approx$ 7 RMB).
1998–2000	National Science Foundation Of China, 74,000 RMB; Basic And Applied Science Foundation Of Yunnan Province, 35,000 RMB; Teaching And Research Foundation Of Yunnan Normal University, 30,000 RMB
1993–1995	Education Foundation Of Yunnan Province, 15,000 RMB

Professional Associations:
Member of the American Physical Society (APS)

Publications:

(i) Submitted and to be submitted

1. **J. Tao** and J. X. Zhu. Ultrafast quasipartical dynamics and optical conductivity of superconductors. In preparation.
2. **J. Tao**, G. Vignale, and I. V. Tokatly, Quantum stress tensor in a magnetic field, to be submitted.
3. **J. Tao**, X. Gao, G. Vignale, and I. V. Tokatly, Continuum mechanics for quantum many-body systems, to be submitted to PRB
4. **J. Tao**, G. Vignale, and J.-X. Zhu, Exchange-correlation stress tensor of the homogeneous system, to be submitted.

(ii) Peer reviewed

1. **J. Tao**, J.P. Perdew, and A. Ruzsinszky, van der Waals interaction-corrected density functional theory. Resubmitted.
2. J.P. Perdew and **J. Tao**, When does static correlation scale to the high-density limit as exchange does?, *J. Mol. Struct. (Theochem)* (to appear).
3. **J. Tao**, S. Tretiak, and J.-X. Zhu, Can time-dependent density functional theory predict the excitation energies of conjugated polymers? Resubmitted to PRB.
4. **J. Tao**, X. Gao, G. Vignale, and I. V. Tokatly, Linear continuum mechanics for quantum many-body systems, *Phys. Rev. Lett. 103:* 086401, 2009.
5. **J. Tao** and S. Tretiak, Absorption spectra of new blue-light emitting oligoquinolines bearing pyrenyl and triphenyl endgroups from time-dependent density functional theory, *J. Chem. Theory Comput. 5:* 866, 2009. (invited for the special issue for John P. Perdew).
6. J.P. Perdew, V.N. Staroverov, **J. Tao**, and G.E. Scuseria, Density functional with

full exact exchange: balanced nonlocality of correlation, and constraint satisfaction, *Phys. Rev. A 78:* 052513, 2008.

7. **J. Tao**, S. Tretiak, and J.-X. Zhu, Absorption spectra of blue-light emitting oligoquinolines from time-dependent density functional theory, *J. Phys. Chem. B 112:* 13701, 2008.
8. **J. Tao**, J.P. Perdew, L.M. Almeida, C. Fiolhais, and S. Kümmel, Non-empirical density functionals investigated for jellium: Spin-polarized surfaces, spherical clusters, and bulk linear response, *Phys. Rev. B 77:* 245107, 2008.
9. **J. Tao**, G. Vignale, and I.V. Tokatly, Quantum stress focusing in descriptive chemistry, *Phys. Rev. Lett. 100:* 206405, 2008.
10. **J. Tao**, S. Tretiak, and J.-X. Zhu, Excitation energies from a time-dependent non-empirical density functional, *J. Chem. Phys. 128:* 084110, 2008.
11. **J. Tao**, J.P. Perdew, V.N. Staroverov, and G.E. Scuseria, Exact-exchange energy density in the gauge of a semilocal density functional approximation, *Phys. Rev. A 77:* 012509, 2008.
12. **J. Tao**, G. Vignale, and I.V. Tokatly, Time-dependent density functional theory: Derivation of gradient-corrected dynamical exchange-correlational potentials, *Phys. Rev. B 76:* 195126, 2007.
13. J.P. Perdew, A. Ruzsinszky, G.I. Csonka, O.A. Vydrov, G.E. Scuseria, V.N. Staroverov, and **J. Tao**, Exact-exchange functional theory for open systems of fluctuating electron number, *Phys. Rev. A 76:* 040501(R), 2007.
14. J.P. Perdew, A. Ruzsinszky,**J. Tao**, G.I. Csonka, and G.E. Scuseria, One-parameter optimization of a non-empirical meta-generalized gradient approximation for the exchange-correlation energy, *Phys. Rev. A 76:* 042506, 2007.
15. **J. Tao**, J.P. Perdew, A. Ruzsinszky, G.E. Scuseria, G.I. Csonka, and V.N. Staroverov, Meta-generalized gradient approximation: Construction and performance of a non-empirical density functional, *Phil. Mag. 87:* 1071, 2007.
16. **J. Tao** and G. Vignale, Analytic expression for the diamagnetic susceptibility of a uniform electron gas, *Phys. Rev. B 74:* 193108, 2006.
17. **J. Tao** and G. Vignale, Time-dependent density functional theory beyond the local density approximation, *Phys. Rev. Lett. 97:* 036403, 2006.
18. L.A. Constantin, J.P. Perdew, and **J. Tao**, Meta-generalized gradient approximation for the exchange-correlation hole with an application to the jellium surface energy, *Phys. Rev. B 73:* 205104, 2006.
19. **J. Tao** and J.P. Perdew, Non-empirical construction of current-density functionals from conventional density functional approximations, *Phys. Rev. Lett. 95:* 196403, 2005.
20. J.P. Perdew, A. Ruzsinszky, **J. Tao**, V.N. Staroverov, G.E. Scuseria, and G.I. Csonka, Prescription for the design and selection of density functional approxima-

tions: More constraint satisfaction with fewer fits, *J. Chem. Phys. 123:* 062201, 2005.

21. **J. Tao**, Explicit inclusion of paramagnetic current density in the exchange-correlation functionals of current-density functional theory, *Phys. Rev. B 71:* 205107, 2005.
22. **J. Tao** and J.P. Perdew, Test of a non-empirical density functional: Short-range part of the van der Waals interaction in rare-gas dimers, *J. Chem. Phys. 122:* 114102, 2005.
23. G.I. Csonka, A. Ruzsinszky, **J. Tao**, and J.P. Perdew, Energies of organic molecules and atoms in density functional theory, *Int. J. Quantum. Chem. 101:* 506, 2005.
24. V.N. Staroverov, G.E. Scuseria, J.P. Perdew, **J. Tao**, and E.R. Davidson, Energies of isoelectronic atomic ions from a successful meta-generalized gradient approximation and other density functionals, *Phys. Rev. A 70:* 012502, 2004.
25. J.P. Perdew, **J. Tao**, V.N. Staroverov, and G.E. Scuseria, Meta-generalized gradient approximation: Explanation of a realistic non-empirical density functional, *J. Chem. Phys. 120:* 6898, 2004.
26. V.N. Staroverov, G.E. Scuseria, **J. Tao**, and J.P. Perdew, Tests of a ladder of density functional approximations for bulk solids and surfaces, *Phys. Rev. B 69:* 075102, 2004.
27. V.N. Staroverov, G.E. Scuseria, **J. Tao**, and J.P. Perdew, Comparative assessment of a new non-empirical meta-GGA density functional: Molecules and hydrogen-bonded complexes, *J. Chem. Phys. 119:* 12129, 2003; *ibid. 121:* 11507(E), 2004.
28. J.P. Perdew, **J. Tao**, and R. Armiento, How to tell an atom from an electron gas: A semi-local index of density inhomogeneity, *Acta Univ. Debreceniensis de Ludovico Kossuth Nominatae Series Physica et Chimica 36:* 25, 2003.
29. **J. Tao**, J.P. Perdew, V.N. Staroverov, and G.E. Scuseria, Climbing the density functional ladder: Non-empirical meta-generalized gradient approximation designed for molecules and solids, *Phys. Rev. Lett. 91:* 146401, 2003.
30. **J. Tao**, M. Springborg, and J.P. Perdew, Properties of the exchange hole under an appropriate coordinate transformation, *J. Chem. Phys. 119:* 6457, 2003.
31. G. Tian, G. Li, and **J. Tao**, Study of relations between position and momentum expectation values for molecules, *Physica Scripta 66:* 449, 2002.
32. **J. Tao**, An accurate MGGA-based hybrid exchange-correlation functional, *J. Chem. Phys. 116:* 2335, 2002; *ibid. 116:* 10557(E), 2002.
33. **J. Tao**, Exchange energy density of an atom as a functional of the electron density, *J. Chem. Phys. 115:* 3519, 2001.
34. **J. Tao**, P. Gori-Giorgi, J. P. Perdew, and R. McWeeny, Uniform electron gas from the Colle-Salvetti functional: Missing long-range correlations, *Phys. Rev. A 63:* 032513, 2001.
35. K. Schmidt, S. Kurth, **J. Tao**, and J. P. Perdew, Comment on "Correlation holes

in a spin-polarized dense electron gas", *Phys. Rev. B 62:* 2227, 2000.

36. P. Ziesche, **J. Tao**, M. Seidl, and J. P. Perdew, How correlation suppresses density fluctuations in the uniform electron gas of one, two, or three dimensions, *Int. J. Quantum. Chem. 77:* 819, 2000.
37. **J. Tao** and G. Li, Approximate bounds to the average electron density for atomic systems, *Physica Scripta 58:* 193, 1998.
38. **J. Tao**, G. Li, and J. Li, Relationships between radial and momentum expectation values of atoms within the Hartree-Fock approximation, *J. Phys. B: At. Mol. Opt. Phys. 31:* 1897, 1998.
39. **J. Tao** and G. Li, Upper bounds for the zeroth-order exchange-energy functional, *J. Phys. B: At. Mol. Opt. Phys. 31:* 1865, 1998.
40. **J. Tao**, G. Li, and J. Li, Bounds to information entropies for atomic systems, *J. Chem. Phys. 107:* 1227, 1997.
41. **J. Tao** and G. Li, Relationships between the zeroth-order kinetic and exchange-energy functionals and the average electron density, *Physica Scripta 56:* 430, 1997.
42. **J. Tao**, G. Li, and J. Li, Rigorous bounds to information entropies for atomic systems, *Physica Scripta 56:* 284, 1997.
43. **J. Tao** and G. Li, Bounds for the zeroth-order exchange-energy functional for atomic systems, *J. Chem. Phys. 105:* 10493, 1996.
44. **J. Tao** and J. Li, Lower bounds to the second-order gradient corrections in the gradient expansions of the kinetic- and exchange-energy functionals for atoms, *Phys. Rev. A 54:* 3859, 1996.
45. **J. Tao**, G. Li, and J. Li, A simple relationship between the second-order gradient correction to the exchange-energy functional and the average electron density for atomic systems, *J. Chem. Phys. 105:* 6995, 1996.
46. **J. Tao** and J. Li, Rigorous lower bounds to the second-order gradient corrections in the gradient expansion of the kinetic and and exchange-energy functionals, *Physica Scripta 54:* 337, 1996.
47. **J. Tao** and J. Li, A simple upper bound to electron momentum density, *Physica Scripta 54:* 335, 1996.

(iii) Not peer reviewed

1. J.P. Perdew, **J. Tao**, and S. Kümmel, Uniform density limit of exchange-correlation energy functionals in *Recent Advances in Electron Correlation Methodology*, edited by A.K. Wilson and K.A. Peterson (ACS Books, 2007, ACS Symposium Series 958, distributed by Oxford University Press).
2. **J. Tao** and J. P. Perdew, Correlation energy densities: E pluribus unum in *Reviews in Modern Quantum Chemistry: A Celebration of the Contributions of R.G. Parr*, edited by K. D. Sen (World Scientific, Singapore, 2002).

(iv) Talks and poster presentations

1. **J. Tao**, S. Tretiak, and J.-X. Zhu, Can time-dependent density functional theory predict the excitation energies of conjugated polymers?, conference on Excited State Processes in Electronic and Bio Nano-Materials, Santa Fe, New Mexico, June 29–July 2, 2009.
2. **J. Tao** and Jian-Xin Zhu, Real-time photoinduced quasi-particle excitation of superconductors, APS March Meeting in Pittsburgh, 2009.
3. **J. Tao** and Jian-Xin Zhu, Optical conductivity in strongly correlated electron materials, APS March Meeting in New Orleans, 2008.
4. **J. Tao**, I.V. Tokatly, and G. Vignale, Quantum stress focusing in descriptive chemistry, APS March Meeting in New Orleans, 2008.
5. **J. Tao**, Sergei Tretiak, and Jian-Xin Zhu, Excitation Energies from a ladder of time-dependent non-empirical density functionals, Conference on Excited State Processes in Electronic and Bio Nano-Materials, Santa Fe, New Mexico, October 1-4, 2007.
6. **J. Tao** and G. Vignale, Continuum mechanics of an inhomogeneous system, APS March Meeting in Denver, 2007.
7. **J. Tao** and G. Vignale, Time-dependent density functional theory beyond the local density approximation, 52nd Midwest Solid State Conference in Kansas, Missouri, October 7-8, 2006.
8. **J. Tao** and G. Vignale, Dynamical exchange-correlation potentials beyond the local density approximation, APS March Meeting in Baltimore, 2006.
9. **J. Tao**, Non-empirical construction of a meta-GGA density functional and extensions, 52nd Midwest Solid State Conference at Columbia, Missouri, October 8-9, 2005.
10. **J. Tao** and J. P. Perdew, Test of a non-empirical density functional: Short-range part of the van der Waals interaction in rare-gas dimers, APS March Meeting in Los Angeles, 2005.
11. V.N. Staroverov, G.E. Scuseria, J.P. Perdew, **J. Tao**, and E.R. Davison, Comprehensive assesment of a non-empirical density functional, 228th ACS National Meeting in Philadelphia, August 22–26, 2004.
12. **J. Tao** and J. P. Perdew, New meta-generalized gradient approximation for the exchange-correlation, 225th ACS National Meeting in New Orleans, March 23–27, 2003.
13. **J. Tao** and J. P. Perdew, New meta-generalized gradient approximation for exchange and correlation in Austin, 2003.
14. **J. Tao** and J. P. Perdew, Construction of a new meta-generalized gradient approximation, workshop on DFT, Sandia National Laboratories in Albuquerque,

New Mexico, August 16–18, 2002.

15. J. P. Perdew, **J. Tao**, and K. Schmidt, Non-empirical meta- generalized gradient approximation for exchange, APS March Meeting in Seattle, 2001.
16. **J. Tao**, P. Gori-Giorgi, J. P. Perdew, and K. Schmidt, correlation energy functional compatible with exact exchange: Correlation factor model, APS March Meeting in Seattle, 2001.
17. P. Gori-Giorgi, **J. Tao**, and J. P. Perdew, Uniform electron gas from the Colle-Salvetti functional: Missing long-range correlations, APS March Meeting in Seattle, 2001.
18. K. Schmidt, S. Kurth, **J. Tao**, and J. P. Perdew, Remarks on a model for the correlation of the uniform electron gas, APS March Meeting in Minneapolis, 2000.

Contact information of my references

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